3.13 Production Processing

3.13.1 Normal Production Processing Scenario

3.13.1.1 Scenario Description

This scenario occurs during a given day of the Release A period at the LaRC DAAC. The DAAC is in stable operations. The production planner sends the next 16 hour portion daily production schedule to Data Processing Subsystem (DPS) representing the processing workload for that day. The Autosys scheduling software, which is part of the DPS, displays the Data Production Requests (DPR) as job boxes. Each DPR represents the execution of a single science software PGE. The DPRs, which have dependencies on data which are not yet available, are kept in a "held" state by Autosys until their data availability subscriptions are fulfilled. The subscription manager software, which is part of the Planning Subsystem, receives subscription notifications for the DPRs and informs the DPS to release the Autosys jobs after all data subscriptions for a given DPR are fulfilled. The Data Processing Subsystem (as managed by the Autosys Job Scheduling engine) runs the PGEs and associated jobs as the resources required for the tasks become available. This procedure continues until all DPRs scheduled for that day have completed.

3.13.1.2 Frequency

Production processing is expected to be a routine event. The production monitor will monitor the daily production schedule at the beginning of each shift and periodically throughout the day. In the normal case, the production monitor only interacts with the system at the beginning of the day and when jobs fail. The loading of a days jobs will occur once in each sixteen hour period. The activation of the daily production schedule in Autosys is automatic and does not require operator intervention.

The Autosys software is a production scheduling tool intended to support the operational activities surrounding production processing. It provides job monitoring, scheduling, fault notification and restart capabilities. It does not perform any planning activities, however it assists the monitor in determining the effects of failure of a DPR and in determining the cause and actions to be taken due to the failure. (Job failure processing is detailed in 3.13.2 Production Processing Job Anomaly Scenario).

3.13.1.3 Assumptions

The assumptions underlying this scenario are as follows:

1. The long term production planning window is one month. Each day the production planner sends a sixteen hour portion of the active plan to the production processing system. This window is adjustable to suit the needs of the DAAC.
2. This scenario represents normal processing and does not investigate various anomalies. It is provided as a basis for comparison with anomalous processing such as that described in 3.13.2 Production Processing Job Anomaly Scenario.

3.13.1.4 Components

There are three components involved with this scenario, the PLANG CI, the Dataserver CI and the PRONG CI. Figure 3.13.1.4-1 indicates the interaction among the personnel and between the personnel and the PLANG CI.

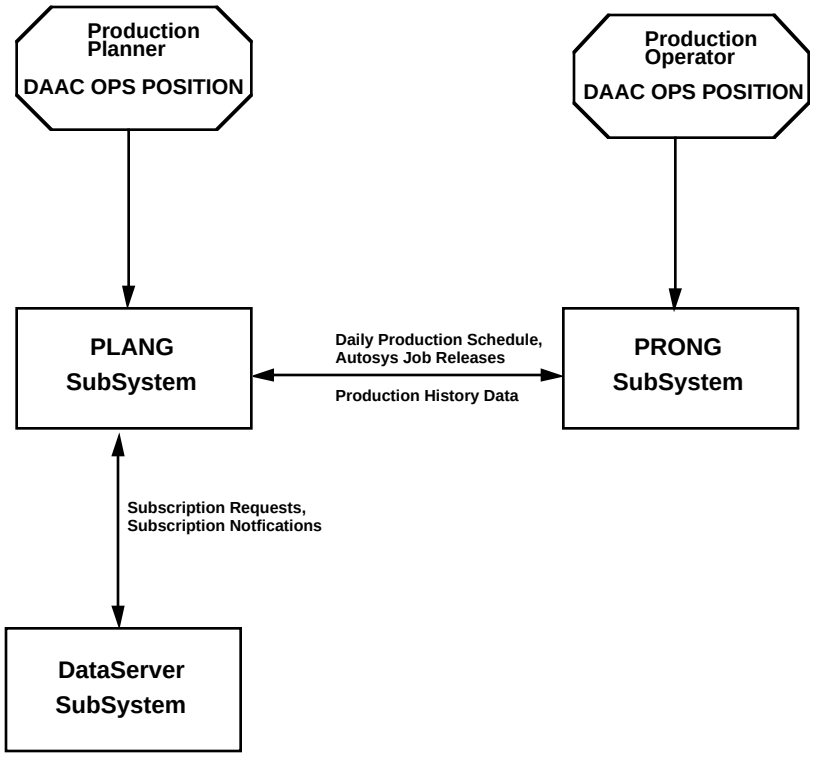

Figure 3.13.1.4-1. Normal Production Processing Components

3.13.1.5 Preconditions

The following preconditions are assumed for this scenario:

1. All necessary technical and management personnel have been involved in establishing the current active production plan.
2. The daily production processing schedule from the previous day has been satisfied.

3.13.1.6 Detailed Steps of Process

Table 3.13.1.6-1 represents the details of the production processing activity for a given day. The time scales indicated are approximate. The Production Planner in this case represents DAAC operations position responsible for production planning. The Production Monitor is the operator responsible for production processing at the DAAC.

Table 3.13.1.6-1. Normal Production Processing (1 of 2)

Step	Time	Duration	Production Planner	Production Monitor	System
1	Start of shift.	5-10 min. (The optimal load time is effected by several tunable parameters in Autosys. Optimal values for these parameters have not yet been determined. The value listed is from customer surveys for the Autosys product during the technical evaluation).	The LaRC Production Planner notes the jobs scheduled for processing today in the month long current active plan. The Production Planner, using the planning workbench software, initiates the "downloading" of the daily schedule of jobs to the Autosys scheduling tool		System converts DPRs into Autosys commands using the Autosys JIL interface. Autosys displays each DPR in a job box which contains all the required jobs for a PGE. Autosys automatically places the jobs in a "held" state while waiting on their data dependencies. Figure 3.13.6.1-1 shows these held DPRs as white job boxes.
2	Periodically throughout the day	Every 3 seconds (Duration varies with the configurable refresh rate of the Autosys software. Optimal refresh rates have not been determined for Release A job loading. This value was used for the Release A CDR demonstration)			The Data Server Subsystem notifies Planning subsystem subscription manager software as subscription requests are fulfilled. The subscription manager software releases the appropriate DPRs from their "held" state as the subscription notifications arrive. This process is automatic and requires no operator intervention.
3	As Above	As Above		Can use the Autosys screen as show in Figure 3.13.6.1-1 to observe and deter-mine processing status of all DPRs throughout the day.	The Processing Subsystem scheduling engine (Autosys) dispatches DPRs as specified by the subscription manager. A typical DPR may contain the following: Resource Allocation, Data Staging, Environment Preparation, PGE execution, Data Destaging and Resource Deallocation. As DPRs finish, their job boxes turn gray. See ceres1a job box in Figure 3.13.6.1-1 for an example.

Step	Time	Duration	Production Planner	Production Monitor	System
4	As Above	As Above		As Above, provides another view of DPR status.	Provides a GANTT chart view of the daily schedule of jobs. See Figure 3.13.6.1-2 for an example.
5	As DPRs complete	N minutes. Variable with the DPR.			The Processing Subsystem scheduling engine (Autosys) stores production history data (e.g., duration, completion code) in its database. The Production planning software uses this information to create the next daily production schedule.

3.13.1.7 Postconditions

At the completion of the above scenario, the PDPS database contains new and updated entries reflecting the production processing status from the current day. The production planner will use this information in determining which DPRs to comprise the next daily production schedule.

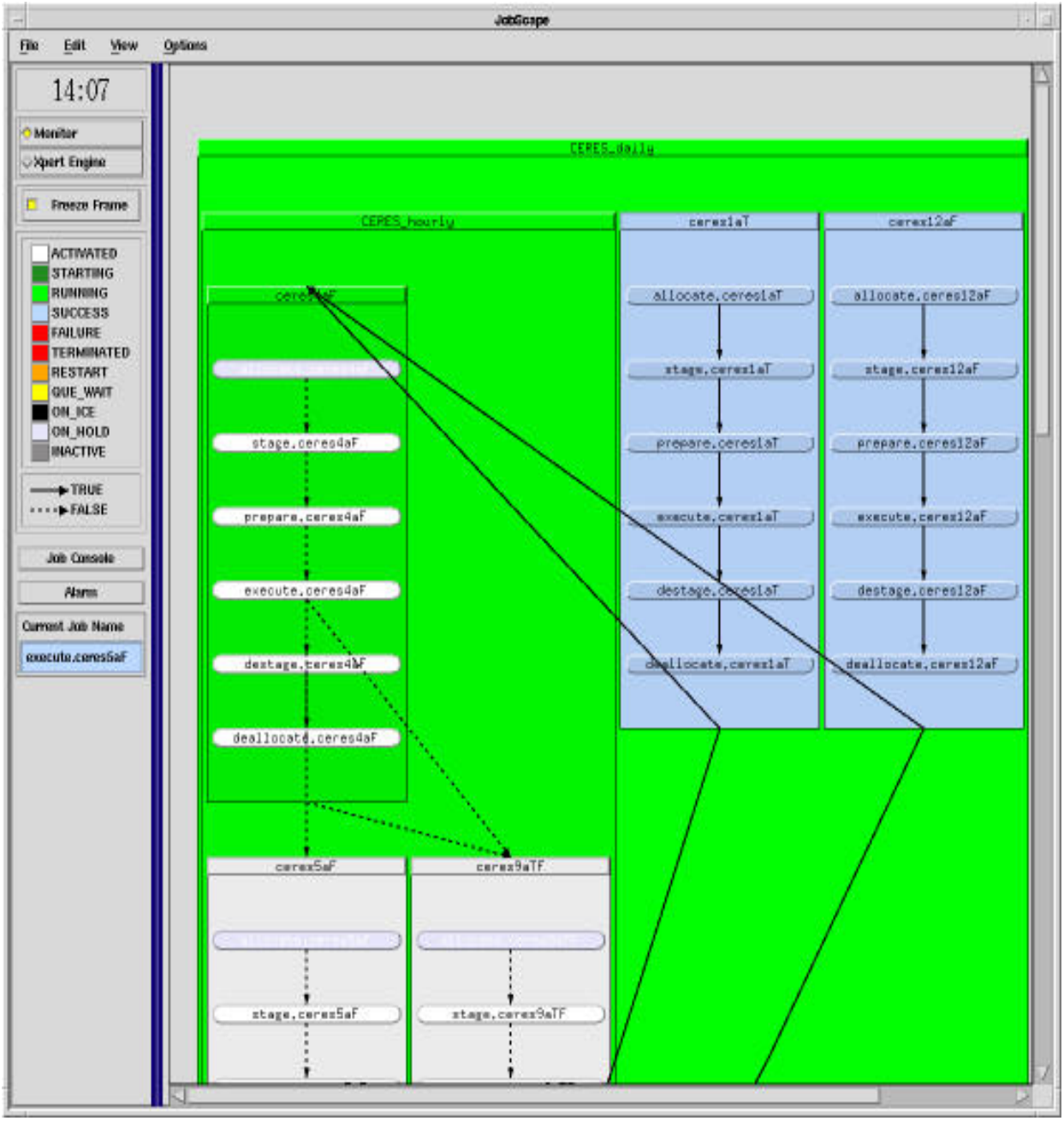

Figure 3.13.1.6-1. Autosys JobScape view of Production

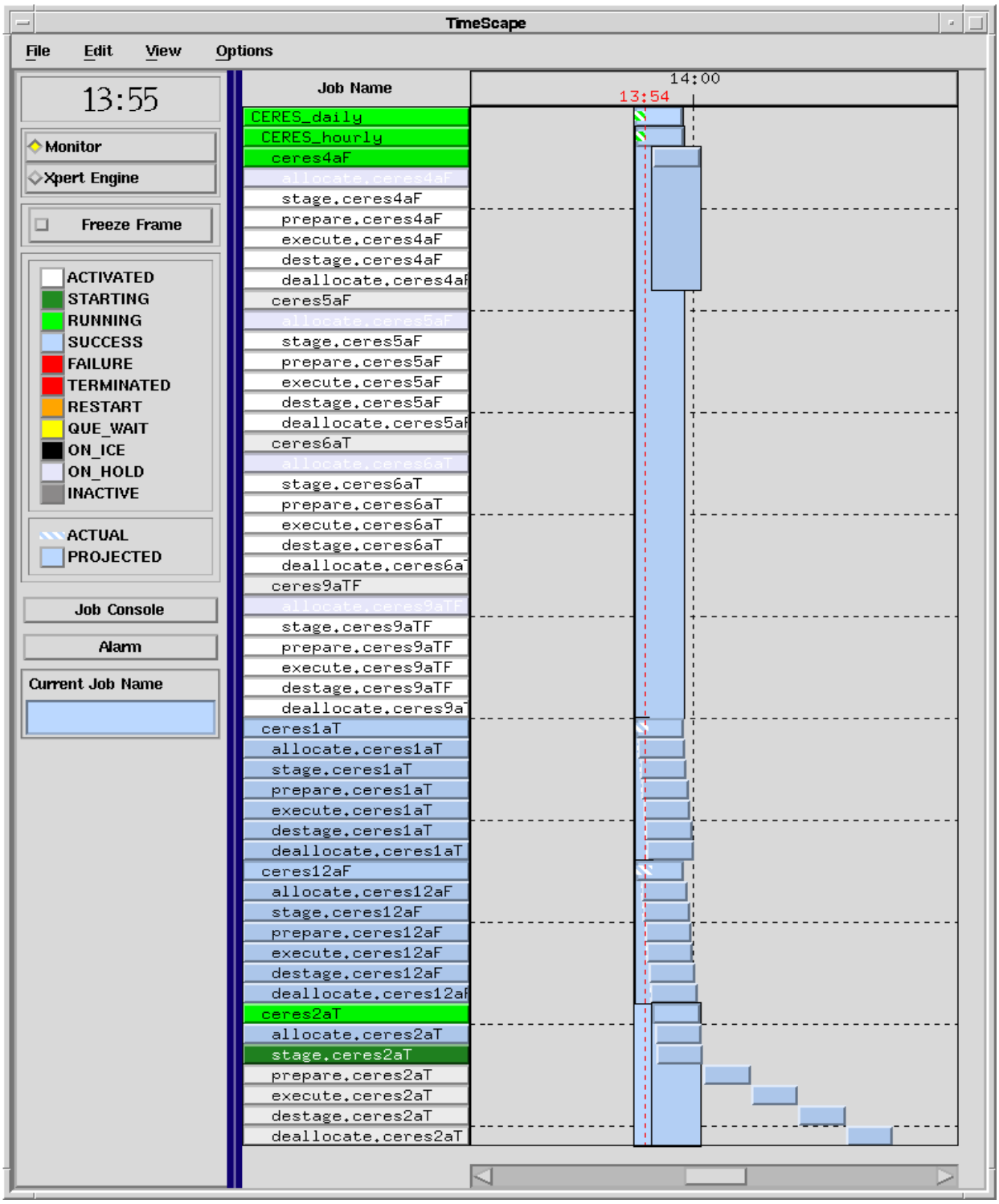

Figure 3.13.1.6-2. Autosys TimeScape view of Production

3.13.2 Production Processing Job Anomaly Scenario

3.13.2.1 Scenario Description

This scenario occurs during a given day of the Release A period at the LaRC DAAC. The DAAC is in stable operations. The daily production schedule for this day has been loaded and PGE execution is in progress. Refer to scenario 3.13.1 for details about normal production schedule processing. The Data Processing Subsystem (as managed by the Autosys Job Scheduling engine) runs the PGEs and associated jobs as the resources required for the tasks become available. This scenario follows a PGE that fails due to an internal software error during execution. The scenario follows the PGE execution from Autosys alarm generation and PGE termination, PGE data destaging, notification the Instrument Team (IT), post-mortem analysis and PGE reprocessing. The actors in this scenario are the DAAC production monitor, the DAAC data specialist and the ECS system as described below.

This scenario addresses anomalies that occur internal to the PGE. These failures include but are not limited to: missing, bad or incomplete input data, PGE software faults, input and output resource failures and communication errors.

This scenario does not address re-initiation of the PGE after failure. Each PGE will have individual methods for re-initiation, from simple resubmission to specialized command line arguments. As this varies widely with the PGE in question it is not addressed here although re-initiation is an option when a PGE fails.

3.13.2.2 Frequency

Production processing job anomalies are expected to be non routine events. However, job anomalies are expected. It is expected that the majority of PGEs run to completion without incident. The production monitor will be alerted to the anomalies that occur and can take the needed action as described below. Less than 5% of PGEs should fall into this category.

3.13.2.3 Assumptions

The assumptions underlying this scenario are as follows:

1. The daily production schedule has been sent from Planning and some of the scheduled PGEs are executing.
2. The failed PGE terminates gracefully and returns a status code.
3. No option to re-initiate the PGE exists for the failed PGE.

3.13.2.4 Components

There are two components involved with this scenario, the Dataserver CI and the Processing CI. Figure 3.13.2.4-1 indicates the interaction among the personnel the CIs.

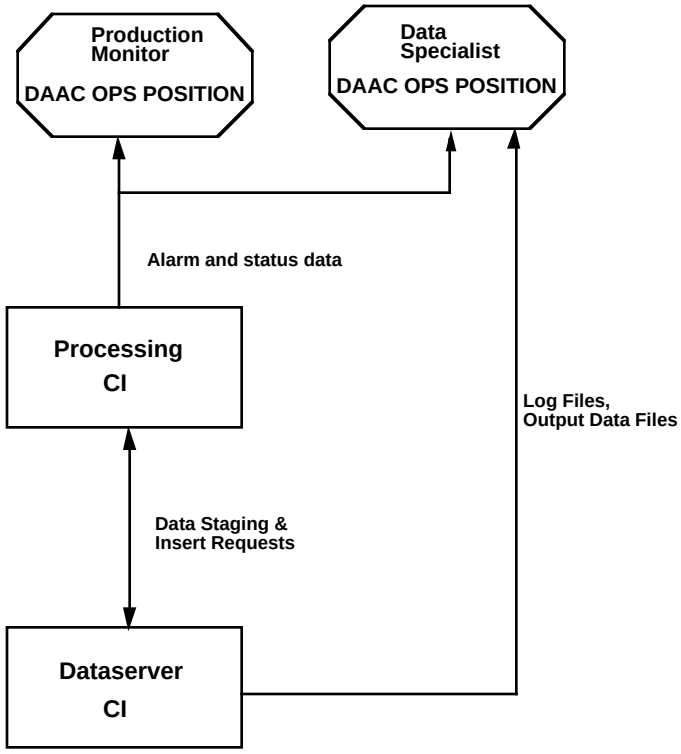

Figure 3.13.2.4-1. Production Processing Job Anomaly Components

3.13.2.5 Preconditions

The following preconditions are assumed for this scenario:

1. The DAAC is operating in normal mode.

3.13.2.6 Detailed Steps of Process

Table 3.13.2.6-1 represents the details of the production job failure due to an internal error. The time scales indicated are approximate. The Production Monitor represents the DAAC operations position responsible for production processing. The DAAC Data Specialist is the contact point for the Instrument Team that ran the PGE that failed.

Table 3.13.2.6-1. Production Processing Job Anomaly (1 of 2)

Step	Time	Duration	Production Monitor	DAAC Data Specialist	System
1	At time of PGE failure	Within 10 minutes for 10,000 jobs. (Duration varies with the configuration of the Autosys software. Optimal configuration has not been determined for Release A job loading. This duration was seen during Release A PDPS prototyping.)	The LaRC production monitor, using the Autosys HostScape View, notes that a PGE (execute.cereas4aF) completed its execution abnormally.		System Displays an Autosys alarm for failed PGE in the Autosys HostScape Display (Figure 3.13.2.6-1).
2	As Above	Within 10 seconds			System sends MSS HP Open View event for the Auto-sys alarm. MSS logs the event.
3	As Above	Within 3 seconds (Duration varies with the configurable refresh rate of the Autosys software. Optimal refresh rates have not been determined for Release A job loading. This value was used during Release A CDR demonstrations.).	The production monitor decides to double check the failed PGE in the timeline and JobScape displays.		System displays the failed PGE in the Autosys TimeScape Display (Figure 3.12.2.6-2) and the Autosys JobScape Display (Figure 3.12.2.6-3). While this step is not mandatory to the scenario, it is presented to show the job failure indications in the three views that Autosys/AutoExpert provides.
4	As Above	Within 5 seconds (Duration varies with the size of the Alarm database)	The production monitor clicks on the HostScape alarm box and views the detailed information regarding the PGE failure.		System displays the Autosys alarm display for detailed alarm information (Figure 3.12.2.6-4).

Step	Time	Duration	Production Monitor	DAAC Data Specialist	System
5	Within a few minutes of PGE Failure.	5 to 10 minutes. (Duration depends on the length and detail of the message.)	The production monitor contacts the responsible DAAC Data Specialist informing them of the PGE failure. (Methods could include e-mail and telephone)		Processing subsystem moves the temporary output and job logs for the failed PGE to the local storage on the appropriate Dataserver for destaging..
6	After notifying of DAAC Data Specialist	5 to 10 Minutes	The production monitor opens a trouble ticket on the PGE failure.		Refer to 3.2.1 Trouble Ticket and Problem Tracking Scenario for the details of this process.
7	Upon Receipt of PGE failure notification	5 minutes to N days (Duration depends on the nature of the PGE failure and the importance of the PGE)		DAAC Data Specialist, coordinating with the SCF, reviews the saved logs, output data and the information received from the production monitor, makes needed adjustments to the PGE and resubmits the algorithm through the AI&T process (refer to 3.4.6 Add New Science Algorithm Scenario for the details of this process).	

3.13.2.7 Postconditions

At the completion of the above scenario, the PDPS database contains new and updated entries reflecting the production processing status from the failed job. The Dataserver contains the job logs and output data from the PGE. The DAAC Data Specialist has been informed of the location of the this data and the detailed alarm information. The DAAC Data Specialist passes the information to the Instrument Team.

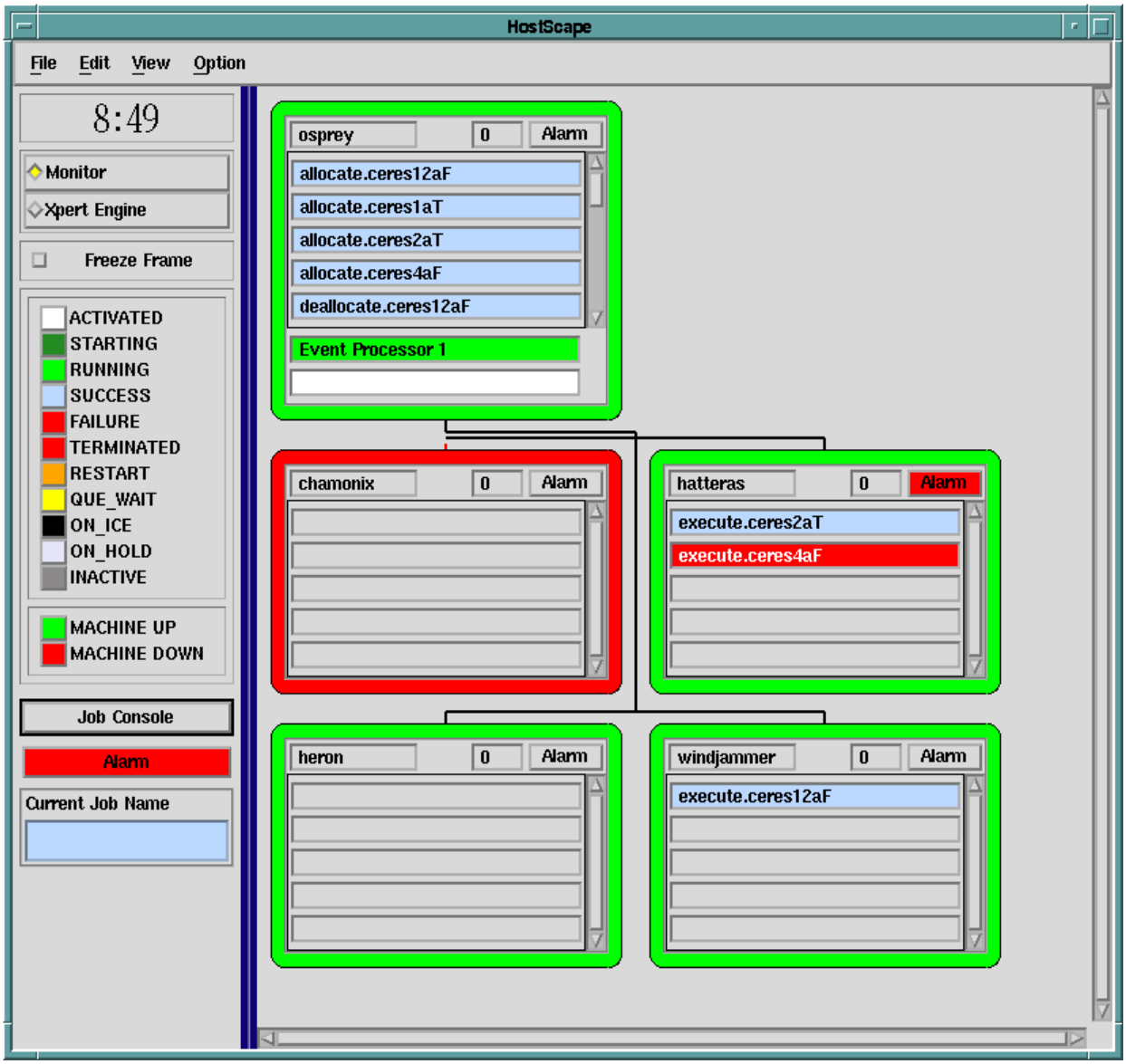

Figure 3.13.2.6-1. Autosys HostScape view of PGE Failure

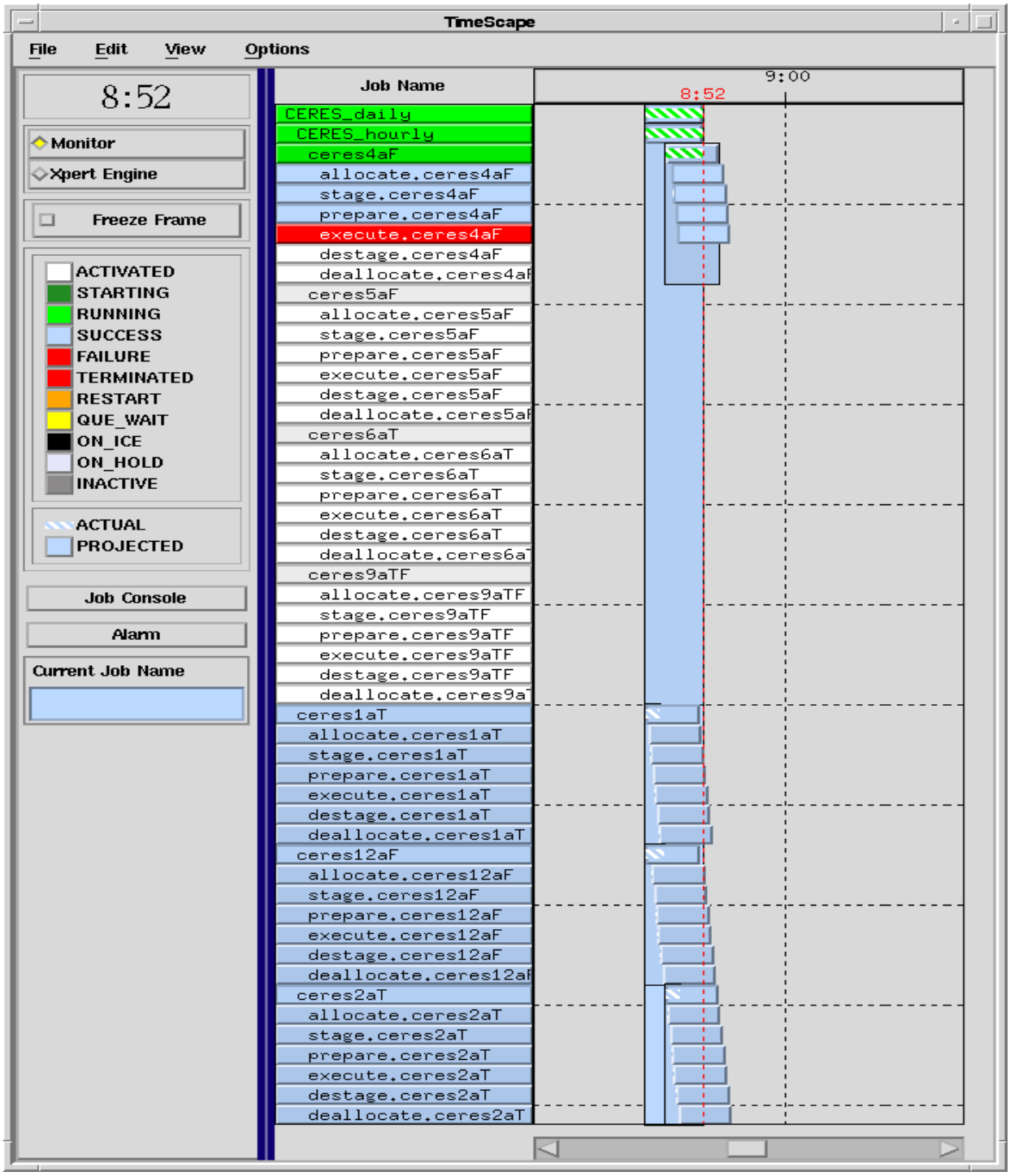

Figure 3.13.2.6-2. Autosys TimeScape view of PGE Failure

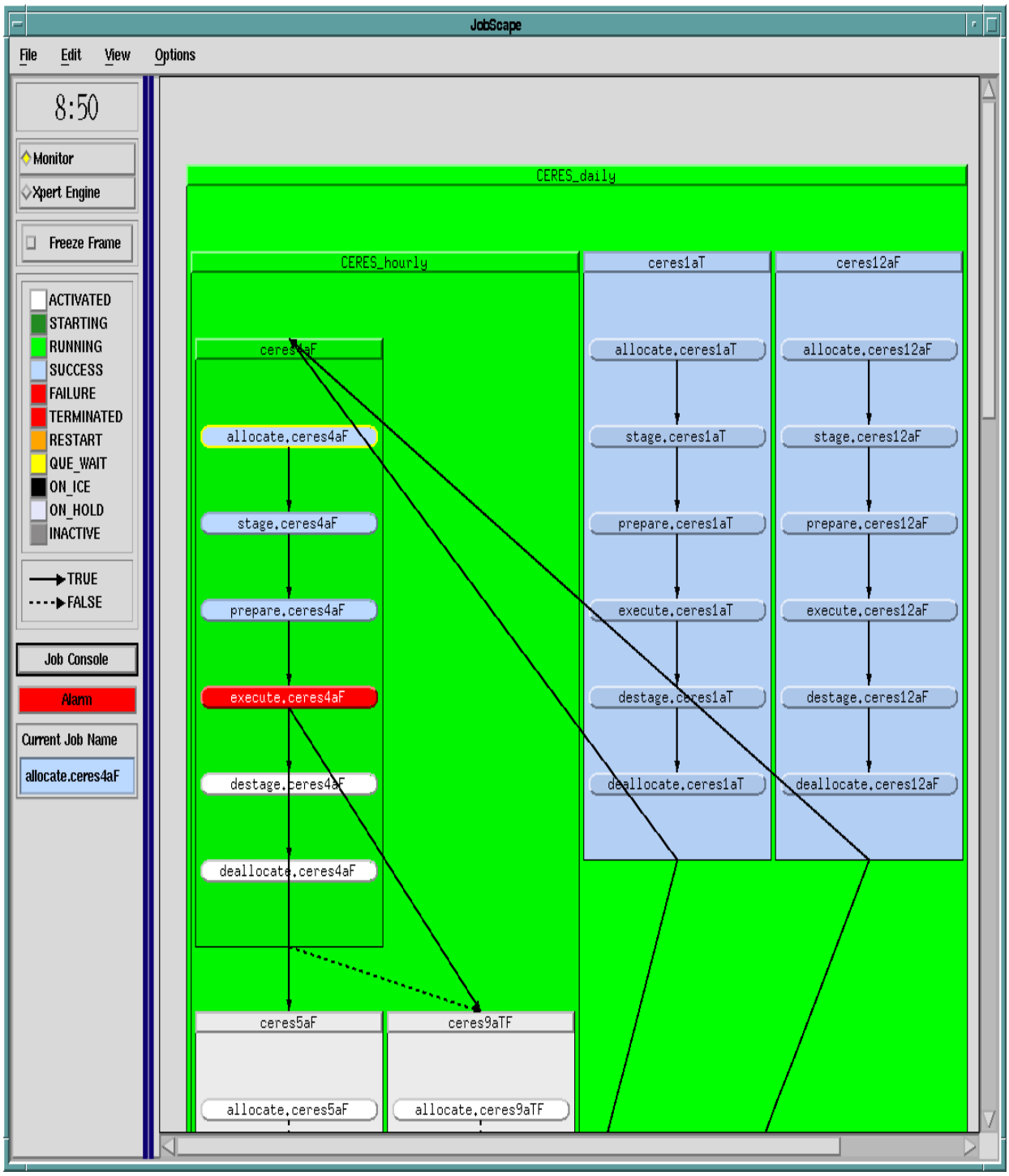

Figure 3.13.2.6-3. Autosys JobScape view of PGE Failure

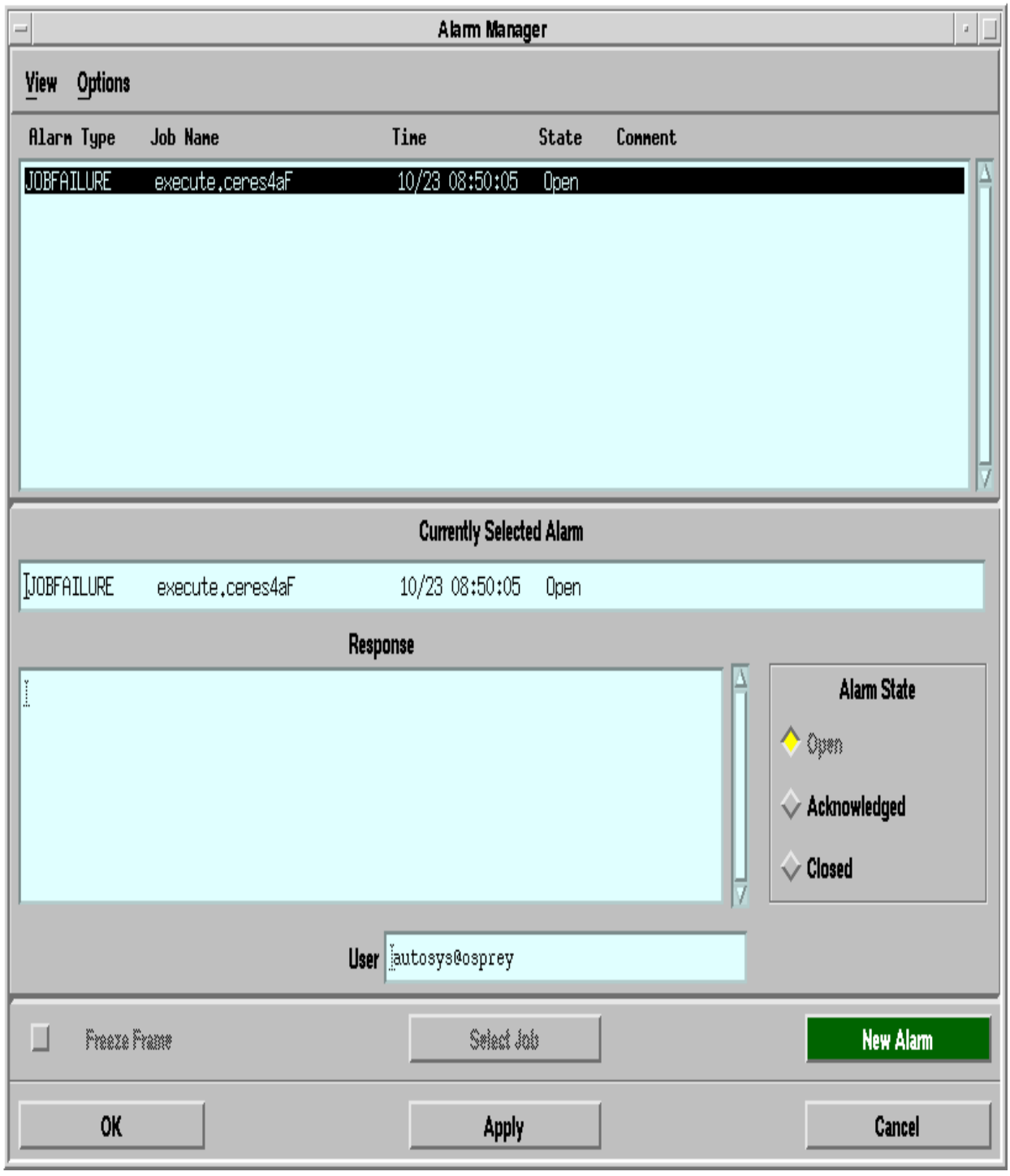

Figure 3.13.2.6-4. Autosys Alarm Details Display

3.13.3 Production Processing Job Modification Scenario

3.13.3.1 Scenario Description

This scenario occurs during a given day of the Release A period at the LaRC DAAC. The DAAC is in stable operations. The daily production schedule for this day has been loaded and PGE execution is in progress although the PGE to be modified has not begun executing. The Data Processing Subsystem (as managed by the Autosys Job Scheduling engine) executes the PGEs and associated jobs as the resources required for the tasks become available. This scenario follows the steps the production monitor takes to change the priority of a PGE. The scenario follows the PGE from selection to priority change. The actors in the scenario are the production monitor and the ECS system.

Note that this change results in the job modification, priority in this scenario, changing only for this execution of the PGE. The change made with the Autosys interface allows the production monitor flexibility in controlling the job schedule. No change is reflected in the PDPS database. A permanent change is accomplished through the planning subsystem GUIs as described in 3.12.2 Replanning Production Scenario.

3.13.3.2 Frequency

Production processing job modifications are expected to be non routine events. It is expected that the majority of PGEs will not require changes. However the ECS allows the production monitor to modify job parameters, such as priority, any time prior to PGE execution. This allows flexibility in unforeseen and unusual circumstances. These circumstances include but are not limited to: Equipment failures, Emergency or high priority processing, Delayed input data, PGEs faults, PGEs with data product dependent components that effect PGE run time (e.g., the PGE runs long or short when clouds are encountered), PGEs with geolocation dependent processing, Unexpectedly high On-Demand processing loads (Release B only).The job modification rate is expected to be very low, well under 5%.

3.13.3.3 Assumptions

The assumptions underlying this scenario are as follows:

1. The daily production schedule has been sent from Planning and some of the scheduled PGEs are executing.
2. The PGE to be modified has not begun execution.

3.13.3.4 Components

The Processing CI is the only component involved in this scenario. Figure 3.13.3.4-1 indicates the interaction between personnel and the CIs.

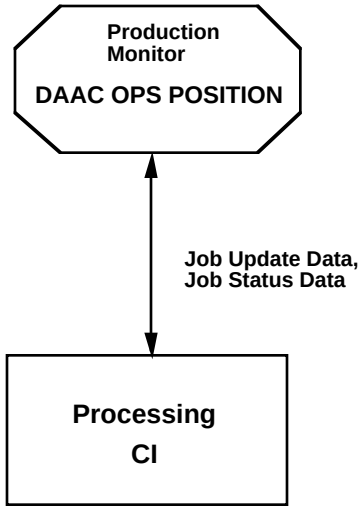

Figure 3.13.3.4-1. Production Processing Job Modification Components

3.13.3.5 Preconditions

The following preconditions are assumed for this scenario:

1. The DAAC is operating in normal mode.

3.13.3.6 Detailed Steps of Process

Table 3.13.3.6-1 represents the details of the production job modification scenario. The time scales indicated are approximate. The Production Monitor represents the DAAC operations position responsible for production processing. The System represents the ECS system Planning and Processing Subsystems.

Table 3.13.3.6-1. Production Processing Job Modification (1 of 1)

Step	Time	Duration	Production Monitor	System
1	Prior to PGE Execution	Within 1 minute	The LaRC Production Monitor, using Autosys, selects a PGE from the Autocons display and presses the Job Definition button.	System displays the Autocons Main Display which allows access to the job definitions display. (Figure 3.13.3.6-1).
2	As Above	Within 10 seconds	The LaRC Production Monitor selects advanced features modification by pressing the Advance Features button on the Job Definitions Display.	System displays the Job Definitions Display which allows access to the advanced job definition display. (Figure 3.13.3.6-2).
3	As Above	Within 10 seconds	The LaRC Production Monitor changes the priority of the selected PGE and saves the data in Autosys by pressing the Save and Dismiss button on the Advanced Job Definition Display	System displays the Advanced Job Definition Display. (Figure 3.13.3.6-3).
4	As Above	Within 5 seconds		Processing subsystem (Autosys) updates the job priority of the selected PGE.

3.13.3.7 Postconditions

At the completion of the above scenario, the Autosys database entry for the selected PGE has been modified as desired.

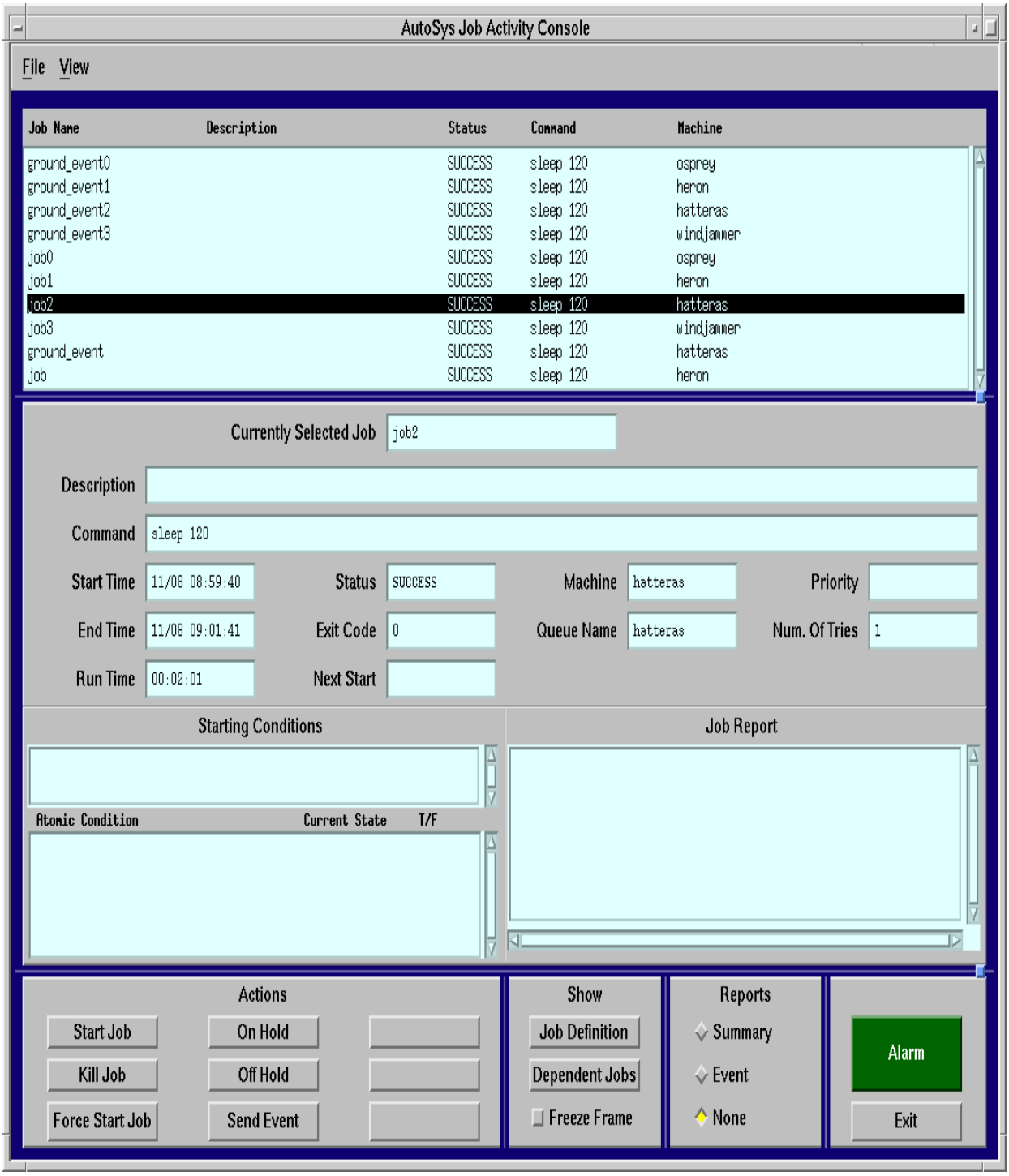

Figure 3.13.3.6-1. Autocons Main Display

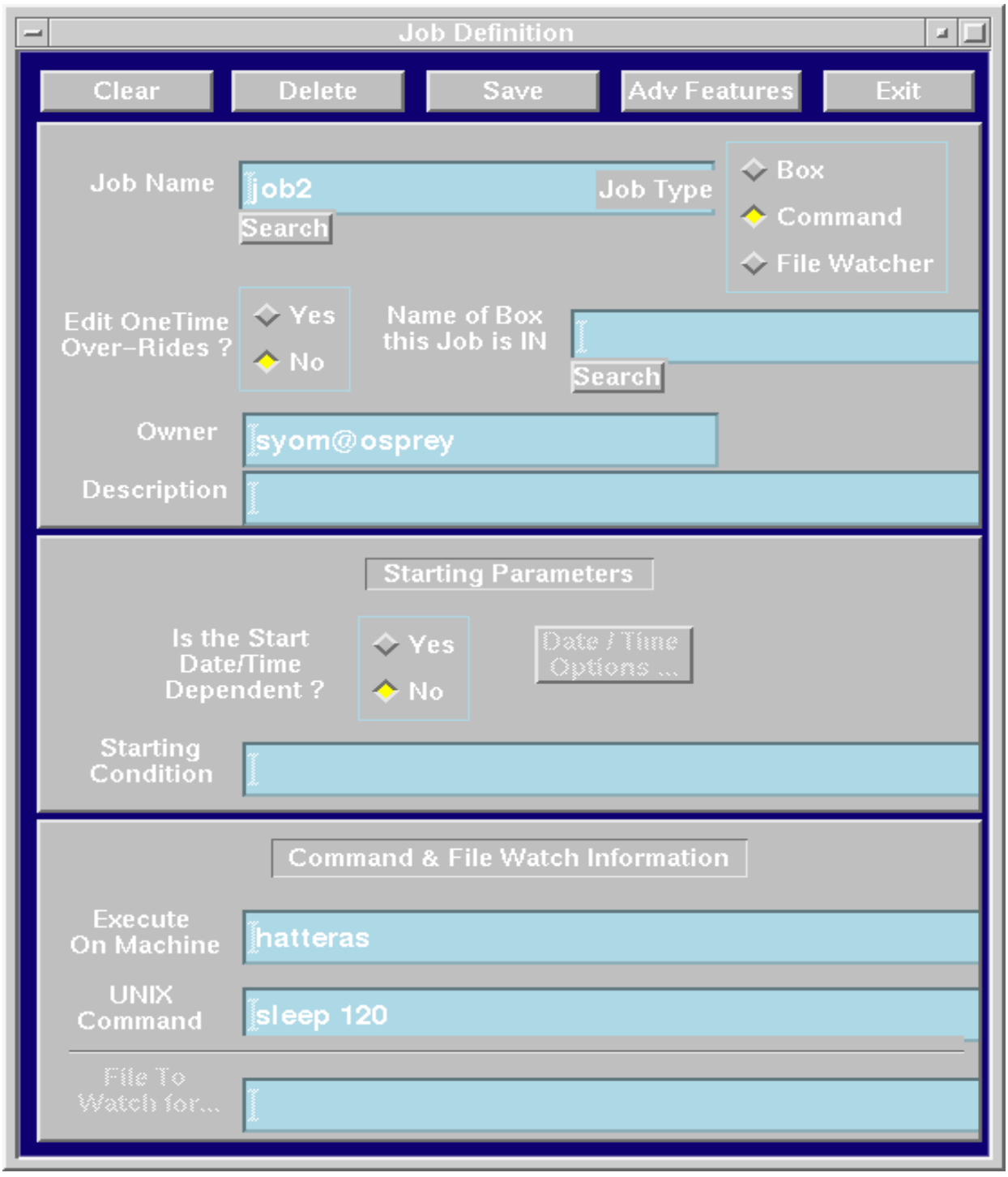

Figure 3.13.3.6-2. Job Definitions Display

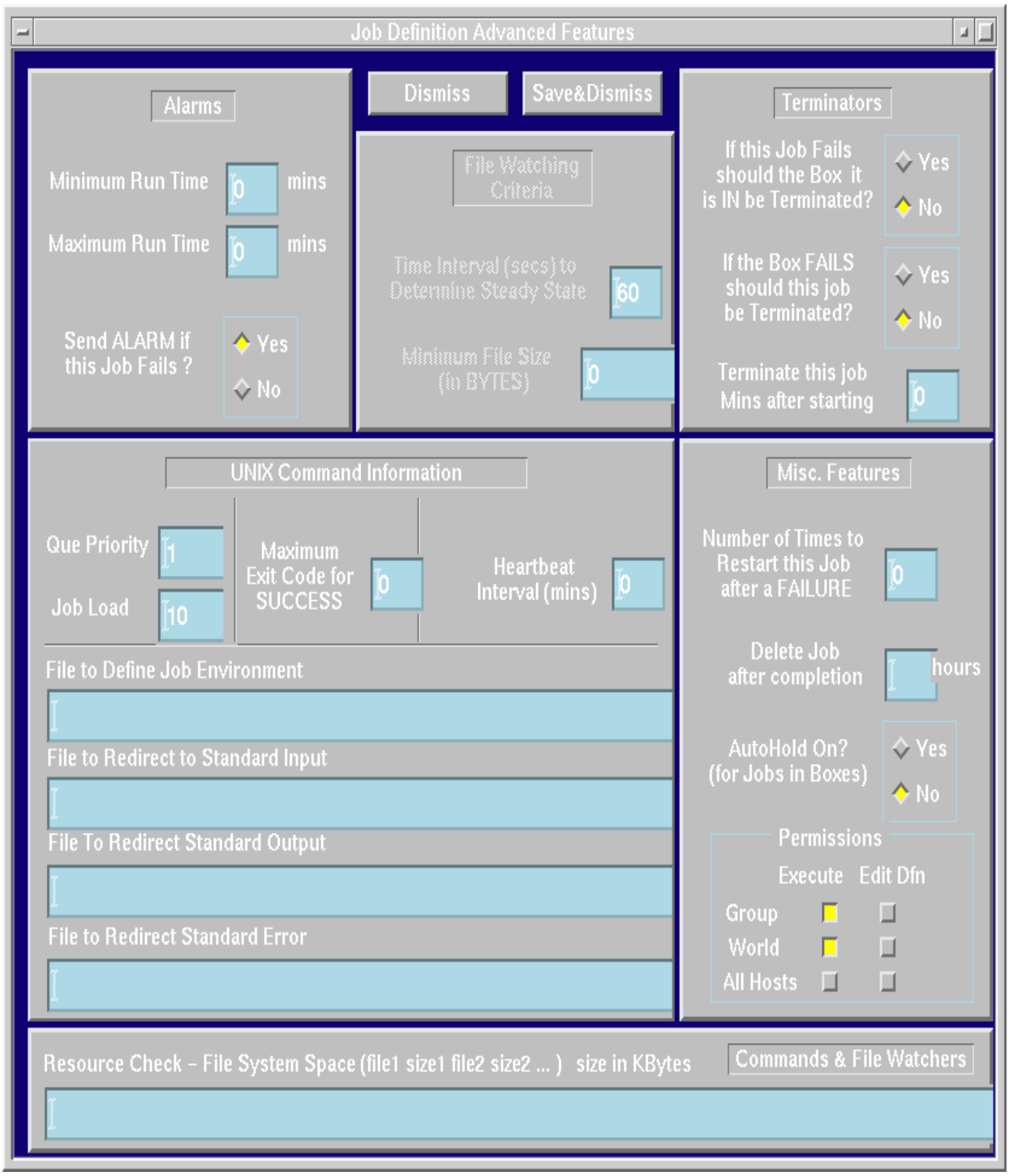

Figure 3.13.3.6-3. Advanced Job Definitions Display